

## WHAT IS CLAIMED IS:

1. An automatic gain control device, comprising:
  - a first control loop for receiving an input voltage and generating a first AGC voltage;
  - 5 a second control loop for receiving the first AGC voltage, registering the first AGC voltage in a digital format, and outputting a second AGC voltage; and
  - a multiplexer for receiving the first AGC voltage and the second AGC voltage and choosing one of the voltages as an AGC voltage according to a hold
  - 10 signal.
2. The AGC device according to claim 1, wherein the first control loop comprises:
  - a variable gain amplifier for receiving the input voltage and amplifying the input voltage to generate an output voltage according to the AGC voltage
  - 15 of the multiplexer;
  - a top detector for receiving the output voltage and outputting a top voltage;
  - a bottom detector for receiving the output voltage and outputting a bottom voltage;
  - a subtractor for receiving the top voltage and the bottom voltage and
  - 20 outputting a voltage difference between the top voltage and the bottom voltage;
  - a target setting unit for generating a target voltage;
  - a first comparator for receiving the voltage difference of the subtractor and the target voltage of the target setting unit and generating a control signal;

a charge pump for receiving the control signal and generating the first AGC voltage; and

a capacitor for receiving the first AGC voltage.

3. The AGC device according to claim 2, wherein the first control loop further  
5 comprises a programmable low-pass filter for filtering high-frequency noises of the first AGC voltage.

4. The AGC device according to claim 1, wherein the second control loop comprises:

a second comparator for receiving the first AGC voltage and the second AGC

10 voltage and outputting a comparison signal;

an up/down counter for counting up or down the pulse number of a counting signal according to the comparison signal as an up/down control signal, and outputting a count value;

a digital-to-analog converter for converting the count value into the second  
15 AGC voltage;

a hold control unit for generating the hold signal according to a hold command; and

a counting signal generator for receiving the hold signal, outputting the counting signal with predetermined frequency when the hold signal is disabled, and holding the counting signal at a constant level when the  
20 hold signal is enabled.

5. The AGC device according to claim 4, wherein the second control loop further comprises a count value protect logic for protecting the count value from

overflowing.

6. The AGC device according to claim 2, wherein the second control loop comprises:

a second comparator for receiving the first AGC voltage and the second AGC  
5 voltage and outputting a comparison signal;

an up/down counter for counting up or down the pulse number of a counting  
signal according to the comparison signal as an up/down control signal,  
and outputting a count value;

a digital-to-analog converter for converting the count value into the second  
10 AGC voltage;

a hold control unit for generating the hold signal according to a hold command;  
and

a counting signal generator for receiving the hold signal, outputting the  
counting signal with predetermined frequency when the hold signal is  
15 disabled, and holding the counting signal at a constant level when the  
hold signal is enabled.

7. The AGC device according to claim 4, wherein the second control loop further  
comprises a count value protect logic for protecting the count value from  
overflowing.

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